

# E9-1-1 Challenges for VoIP: Technical, Business, Regulatory

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# Agenda

- Coming from a Wireless Perspective
- VoIP – A Challenging Environment
  - Technical
  - Business
  - Regulatory
- Applying Wireless Lessons Learned

# Coming from a Wireless Perspective

Established in 1987

- **HQ: Annapolis, Maryland, USA**
- **Offices: Seattle, Tampa, London**
- **Data Centers: Washington, Arizona and Maryland**
- **NASDAQ: TSYS, August 2000**



## Strategic Offers

- **Wireless Location & Messaging**
- **Satellite Services**
- **Professional Services**
- **Homeland Security**



## Industry Relations

- **Founding Member: SMS Forum, PAM Forum, IN Forum**
- **Member: CTIA, ETSI, GSM, 3GPP, LIF, Wireless Village, WAP Forum, OMA**



# TCS Experience

## Wireless Carriers

- Contractual relationships with over 46 wireless carriers
- Contracted to deploy E911 services to over 56 million subs for over 35 carriers (4 of top 5)

## Local Exchange Carriers (LECs)

- Working relationships with all of the major LECs and many CLECs and smaller telecom providers

## PSAPs

- Deployed wireless E911 in 42 states to over 4600 PSAPs
- Member of NENA, APCO and ComCARE
- Charter member of NENA Next Generation task force
- Former public safety officials on staff and in management

# E9-1-1 Success Stories

# Requirements for E9-1-1

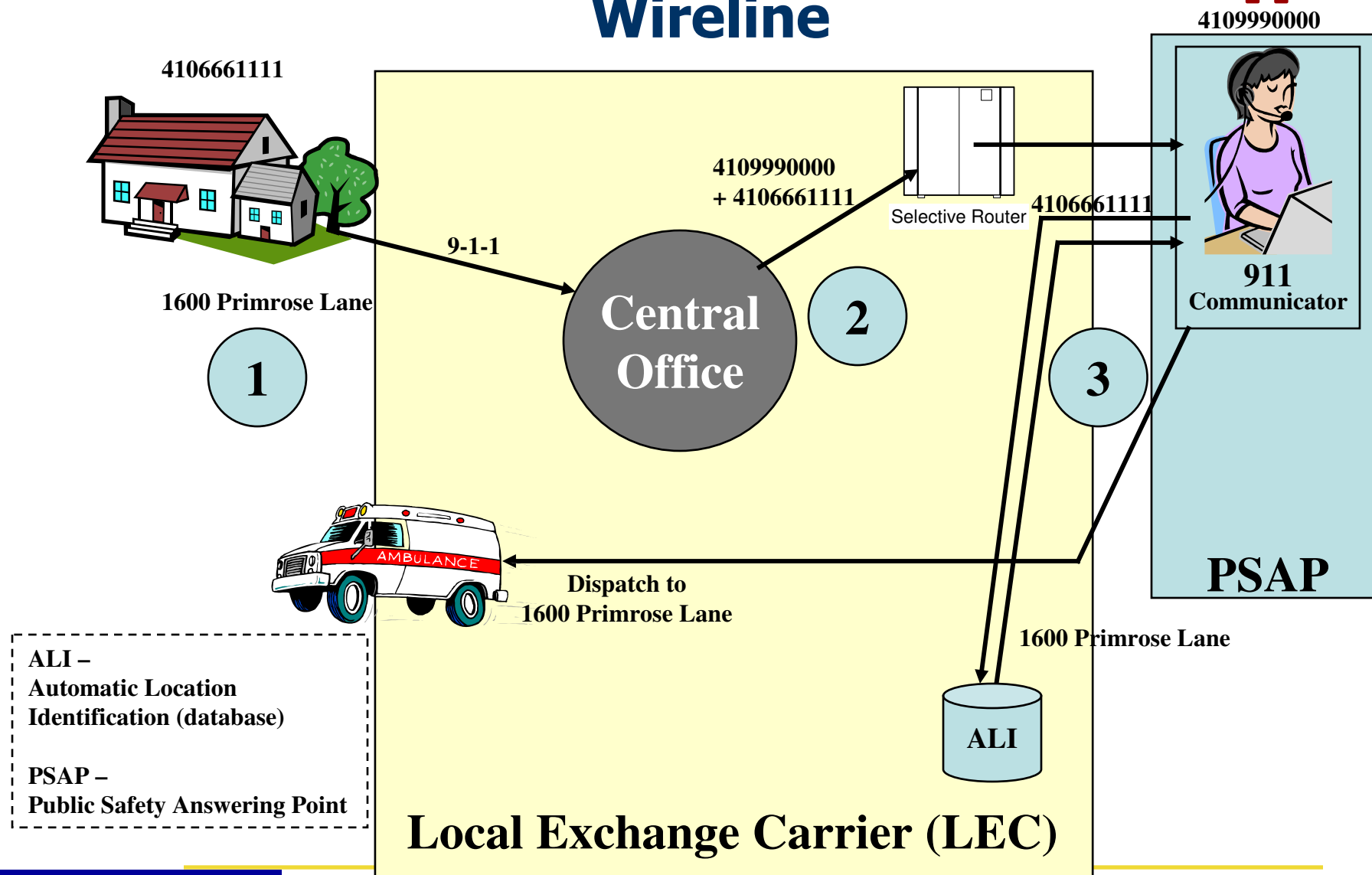
Requirements for a proper E9-1-1 call:

1. Must know location of caller
2. Must use caller location to route call
  - The US has over 8000 Public Safety Answering Points (PSAPs)
  - PSAPs typically cover metropolitan areas or counties
  - PSAPs are Call Centers which dispatch Emergency Services
3. Must deliver caller location
  - Call Centers can automatically receive location information
    - For wireline, street address information is delivered
    - For wireless, latitude/longitude information is delivered

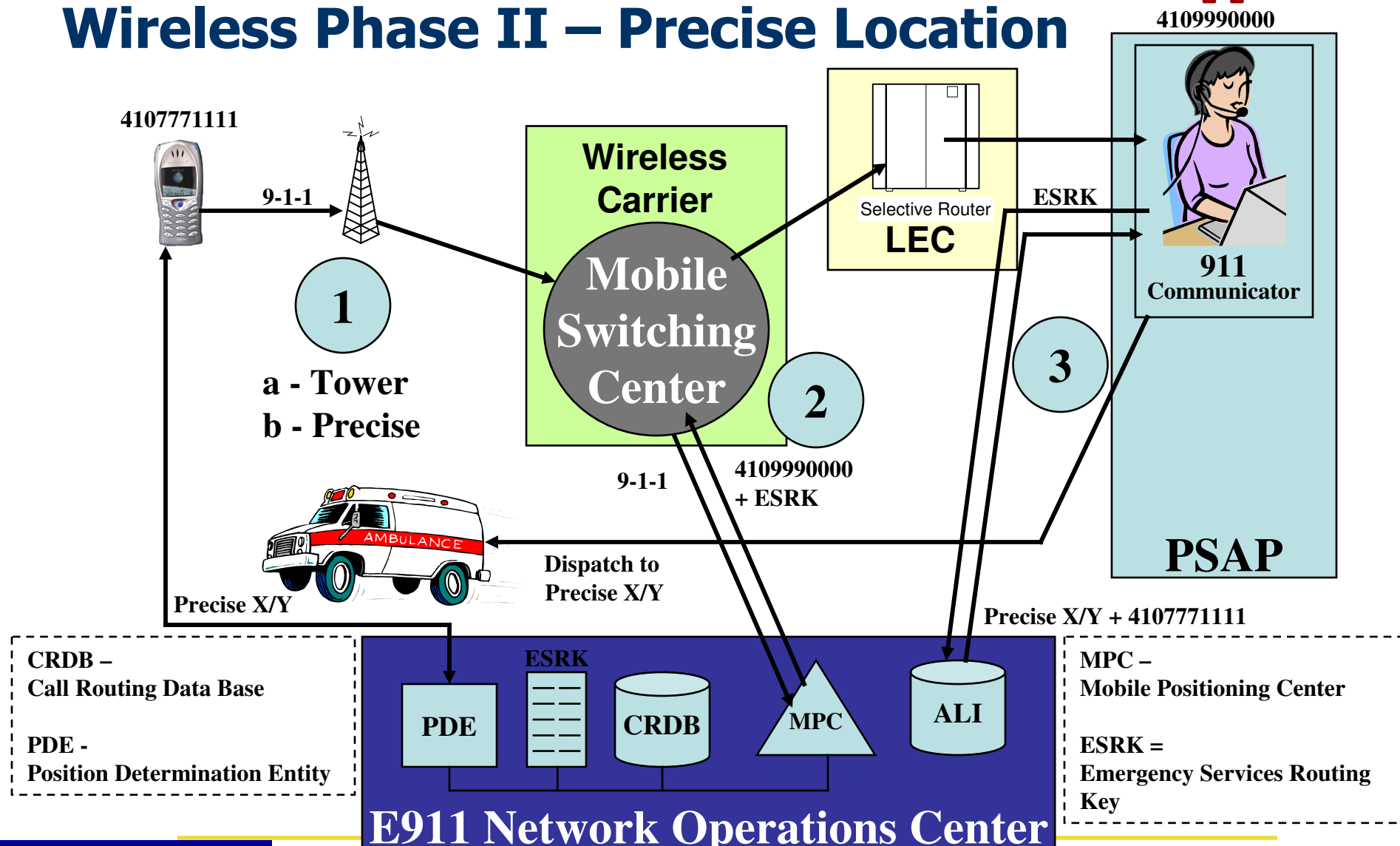
**1 [Location] + 2 [Routing] + 3[Delivery] = Full E9-1-1!**



## Wireline E9-1-1 Success Wireline



## Wireless E9-1-1 Success Wireless Phase II – Precise Location



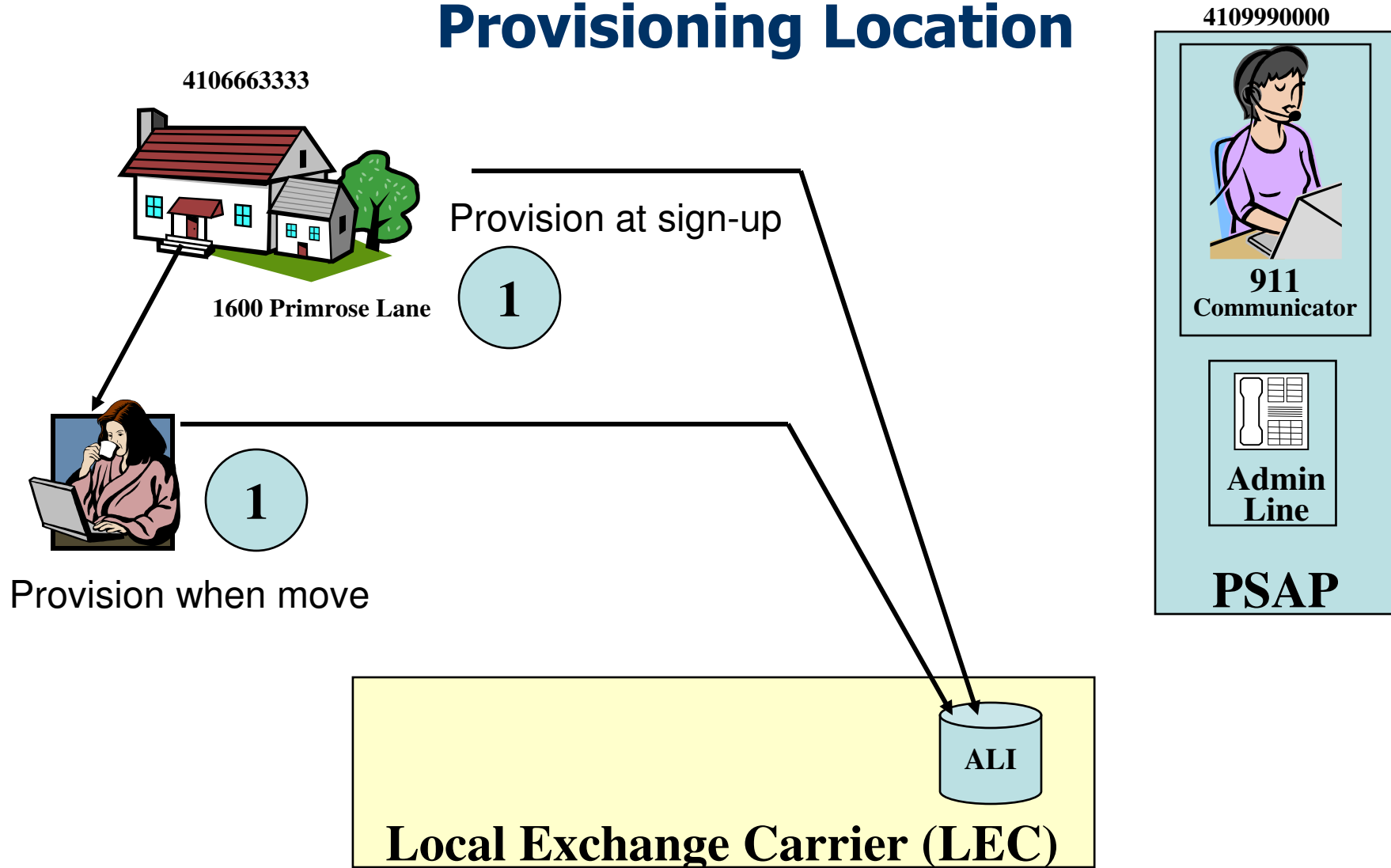


# **The Current VoIP E9-1-1 Problems**

## **“The Database Approach”**

# New Challenges for E9-1-1: VoIP!

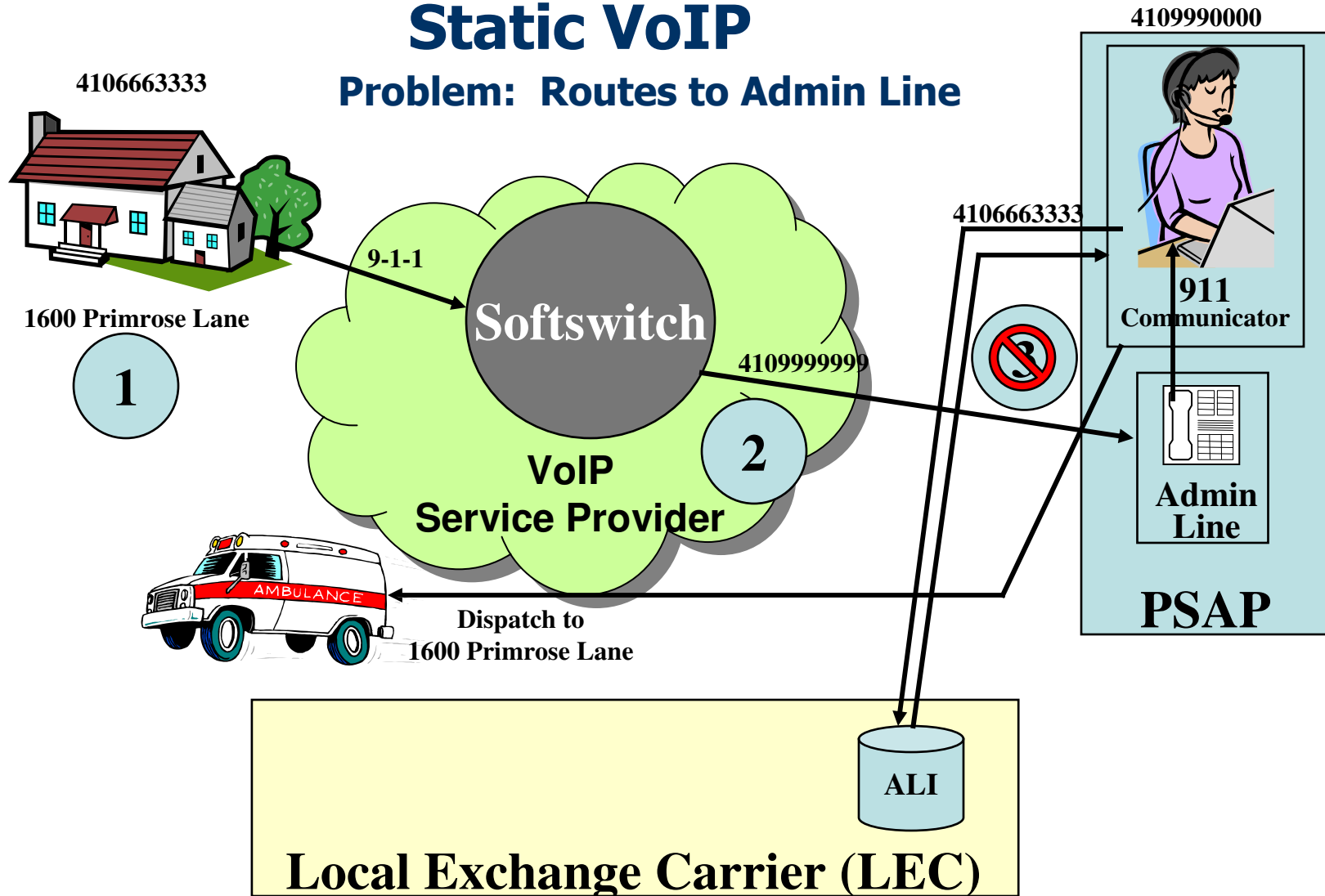
## Provisioning Location



# New Challenges for E9-1-1: VoIP!

## Static VoIP

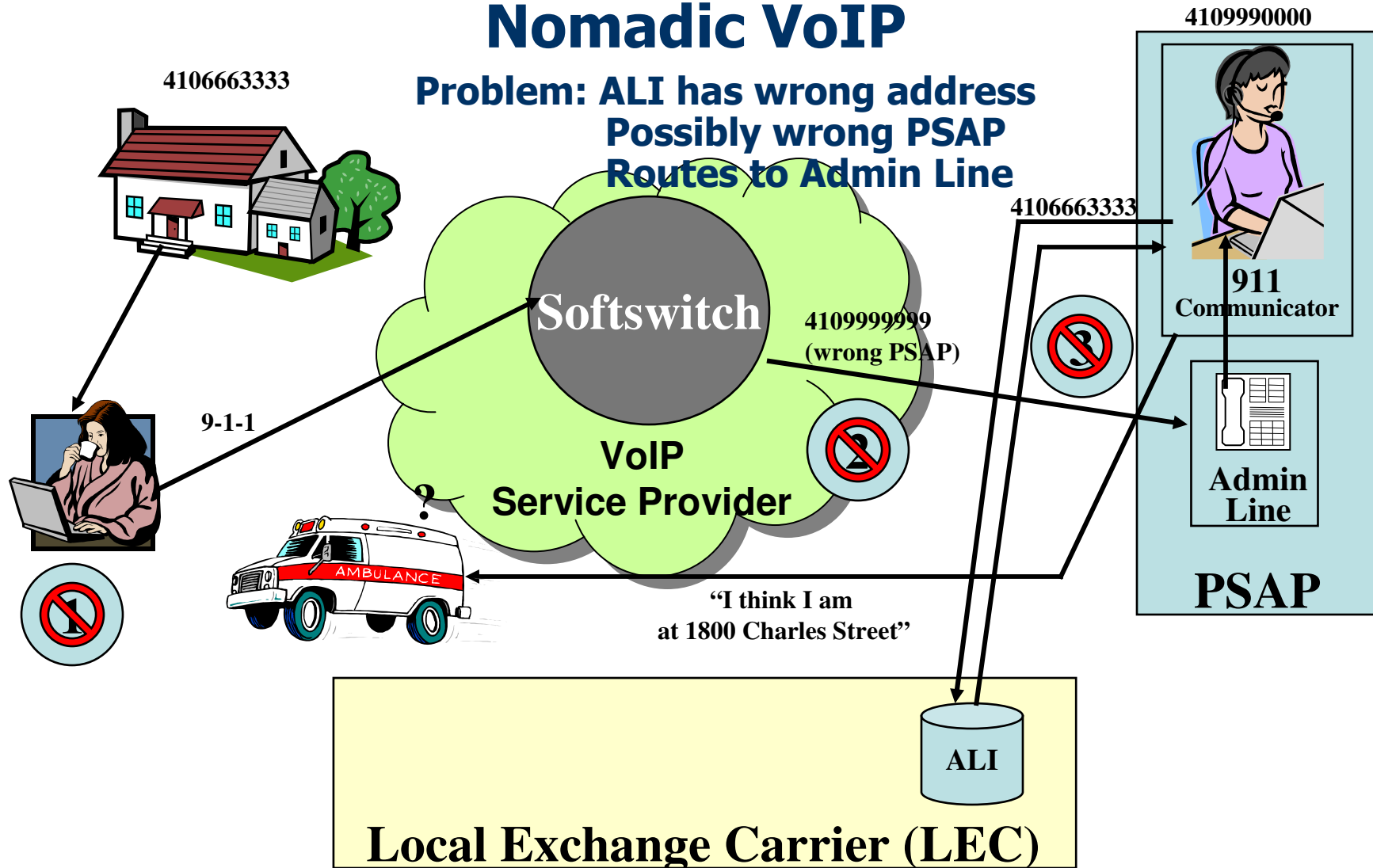
**Problem: Routes to Admin Line**



# New Challenges for E9-1-1: VoIP!

## Nomadic VoIP

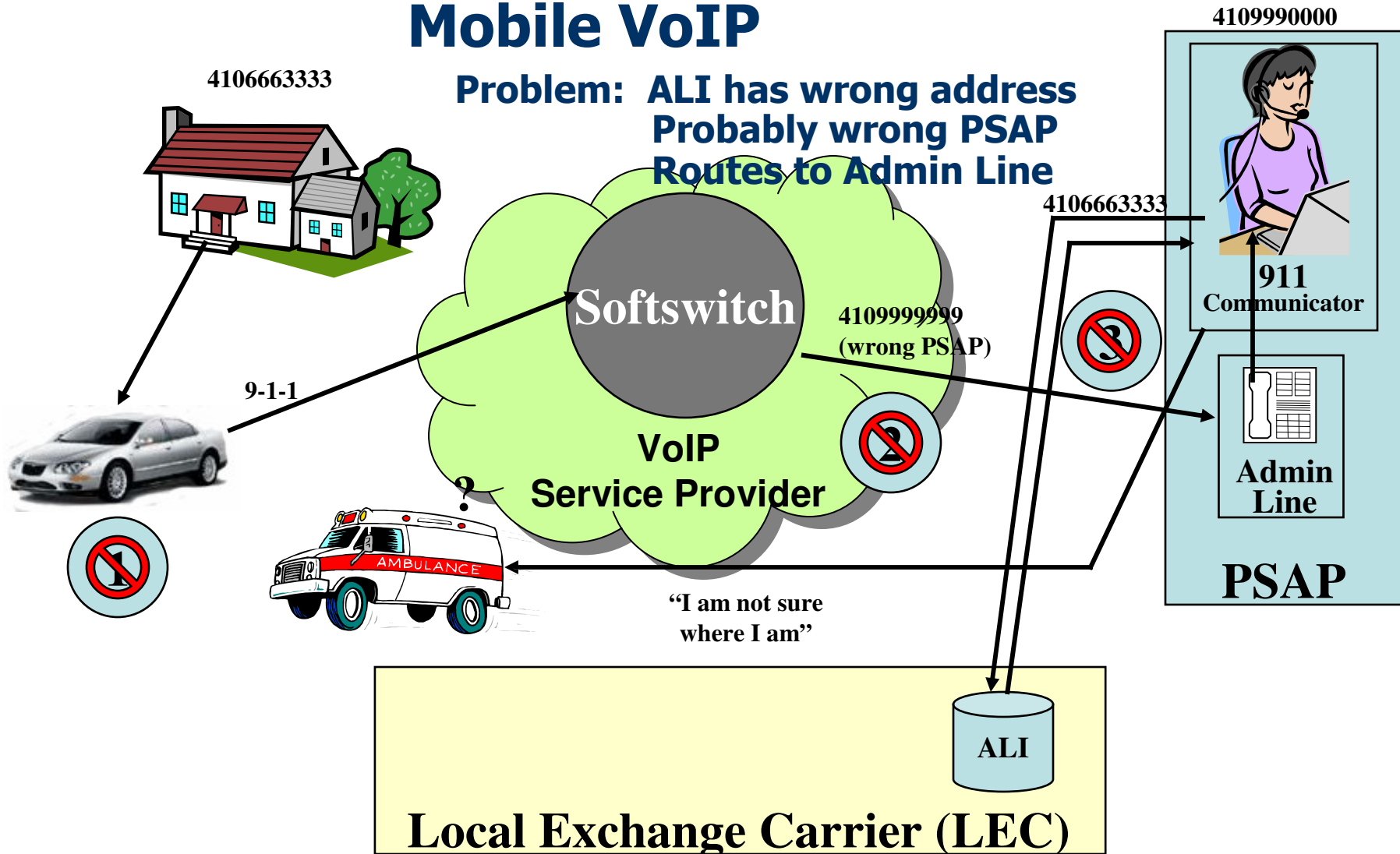
**Problem: ALI has wrong address  
Possibly wrong PSAP  
Routes to Admin Line**



# New Challenges for E9-1-1: VoIP!

## Mobile VoIP

**Problem: ALI has wrong address  
Probably wrong PSAP  
Routes to Admin Line**



# VoIP E9-1-1 Challenges: Technical

- Technical Issues

- Location
    - Difficulty locating caller
    - Location information might not be up-to-date
    - Location info population cannot work across jurisdictions
      - Numbering plans work along geographic boundaries
      - PSAP infrastructure goes across multiple wireline providers
    - PSAP infrastructure might not support foreign TNs
      - PSAPs typically accept calls only from their local jurisdictions
  - Routing
    - Need for a nationwide admin line database
    - Challenges with “default” routing
      - How do you route a call that does not have a location fix?
  - Delivery
    - Location not automatically delivered to PSAP

**Decreasing caller confidence in 9-1-1!**

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# Location: The Toughest Technical Challenge

- Issues around getting the Location
  - Nomadic & Mobile users are not at their “home”
  - Need for automatic location techniques
    - Port Discovery Techniques
    - Triangulation Techniques
    - Handset-based Location Techniques not yet available
  - Current techniques involve manual update
    - Location info takes 24 to 48 hours to update
- Hope for the future
  - Most near-term VoIP will be over Private Data Networks
    - Private networks can pass location to central location
      - Location Information System (LIS)
    - Public networks CANNOT pass location with current IP technology
  - Mobile VoIP solutions will likely involve cellular
    - Cellular already has integrated GPS into handsets
    - Mobile VoIP phones will likely have GPS capabilities



# Automatic Location: Port Discovery

- **Port identification & discovery**
  - System identifies ports in use
  - System interrogates devices attached to ports
  - Port mapped to telecom identifier
  - Administrator can map port to a specific location
  - Done for PBX systems today
    - Helps business meet FCC E9-1-1 MLTS requirements
    - Updates submitted daily – activated w/in 48 hours
  - VoIP implementations will change more rapidly
    - 48-hour delays will impact progress on MLTS issues

**This can be solved by taking a “network” approach**

# Automatic Location: Triangulation

- **WiFi triangulation techniques**

- Triangulates on attached devices
- System interrogates devices attached to ports
- Interacts w/ client software on device
- With three connections, can triangulate within 1 meter
- Information is not automatically passed to PSAPs today

**This can be solved by taking a “network” approach**

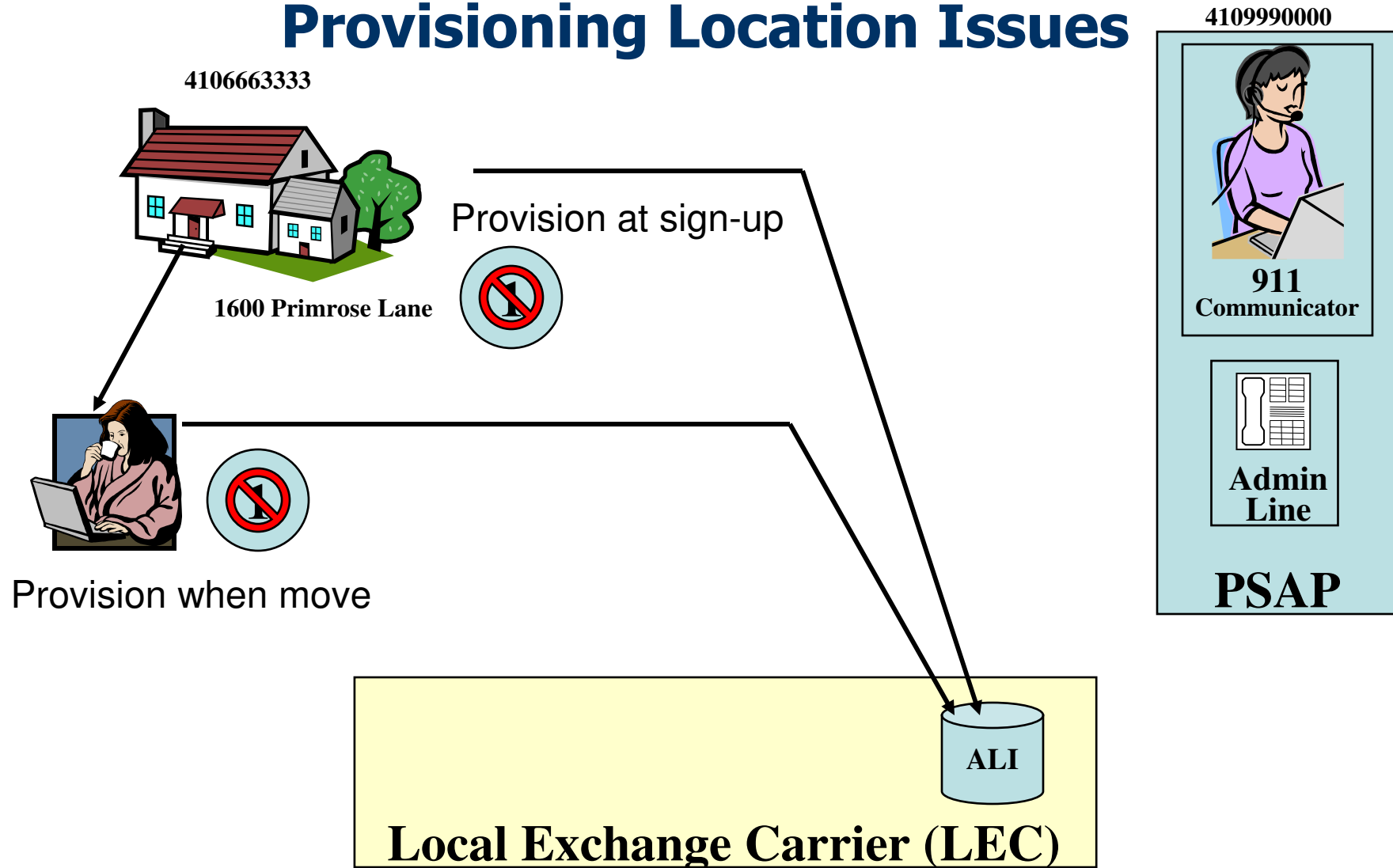
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# Location Information Not Up-To-Date

## Provisioning Location Issues



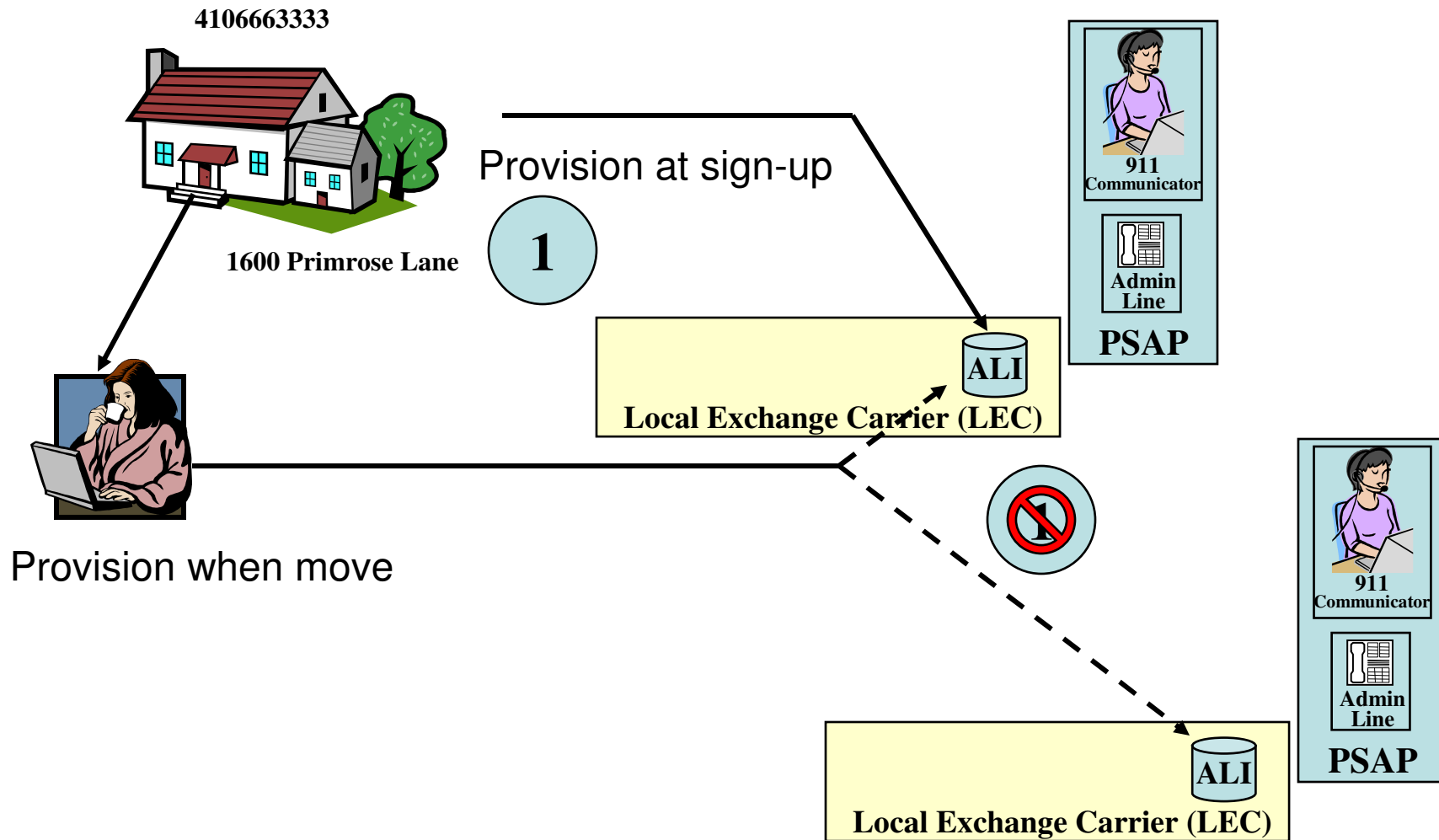
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# Location Cannot Cross Jurisdictions

## Provisioning Location Issues



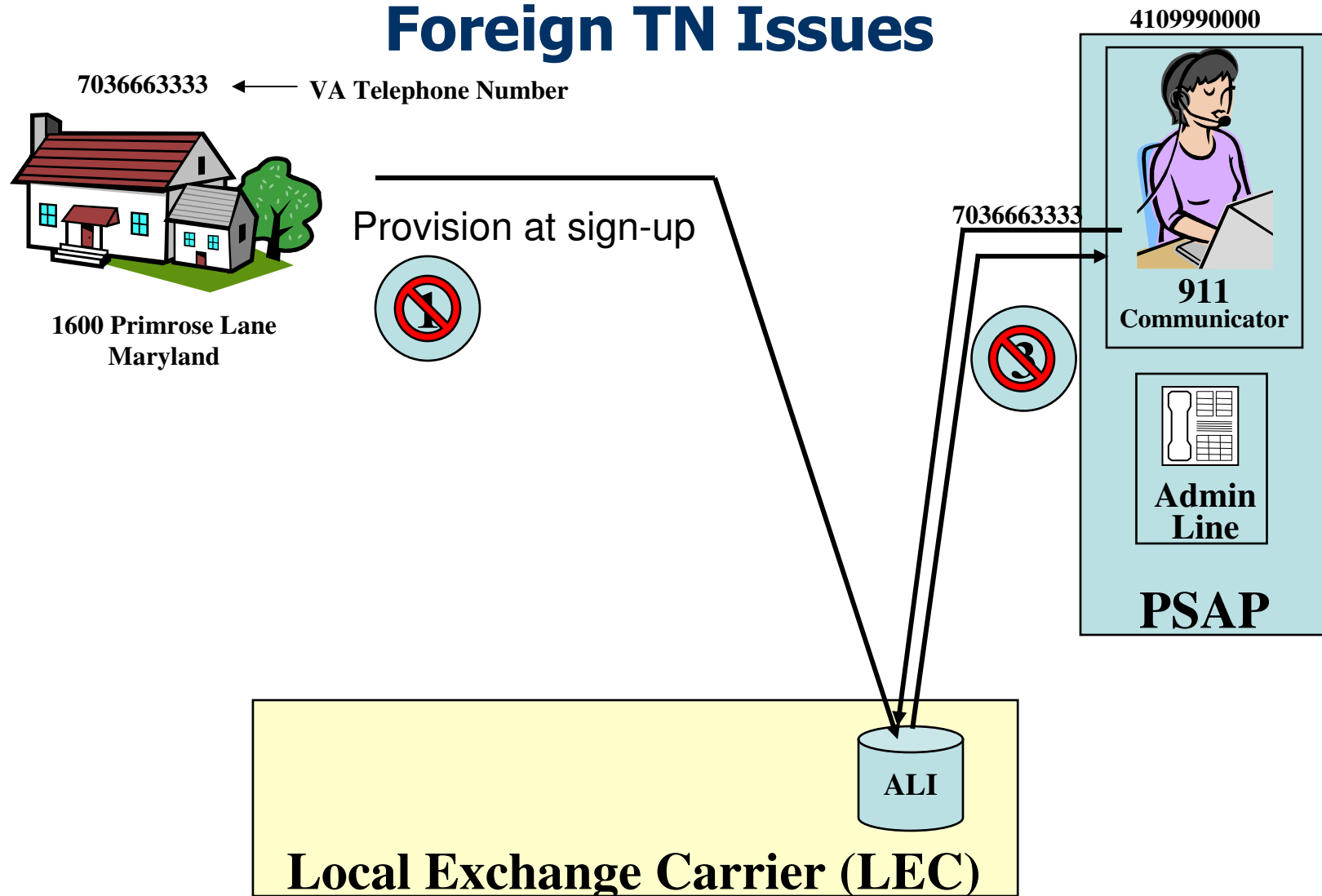
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# Location Information Not Up-To-Date

## Foreign TN Issues





# VoIP E9-1-1 Challenges: Technical

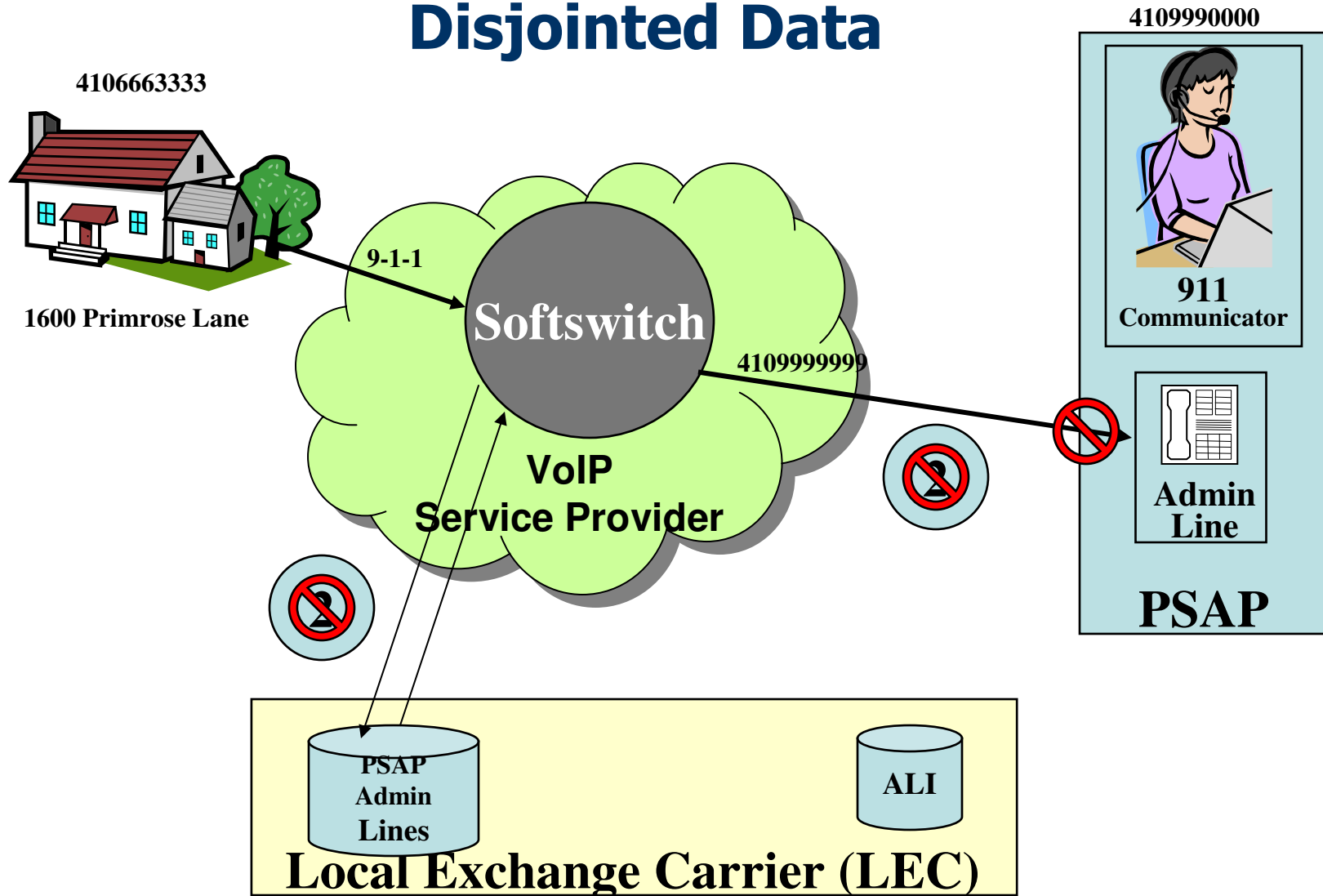
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# No Nationwide PSAP Admin Line List

## Disjointed Data



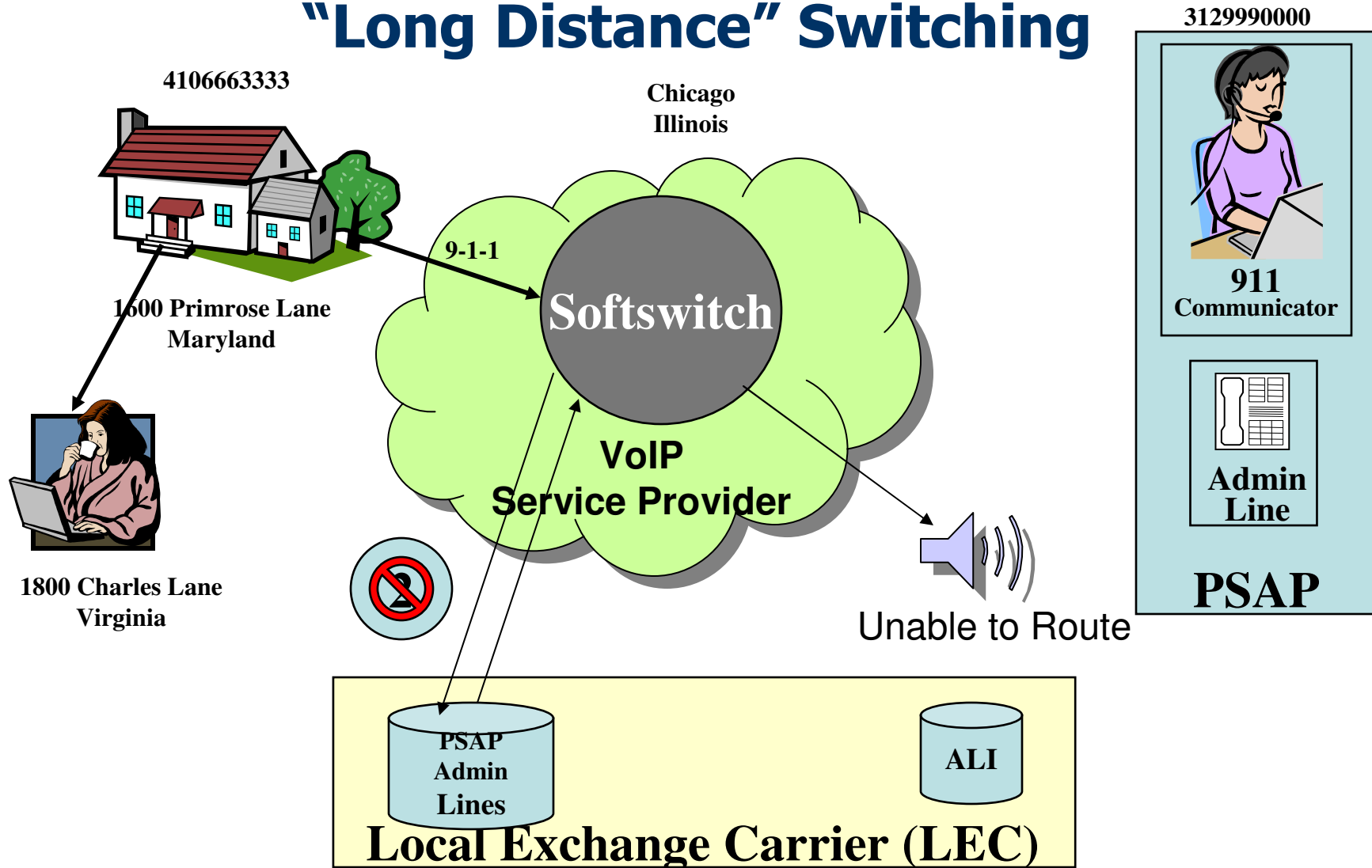
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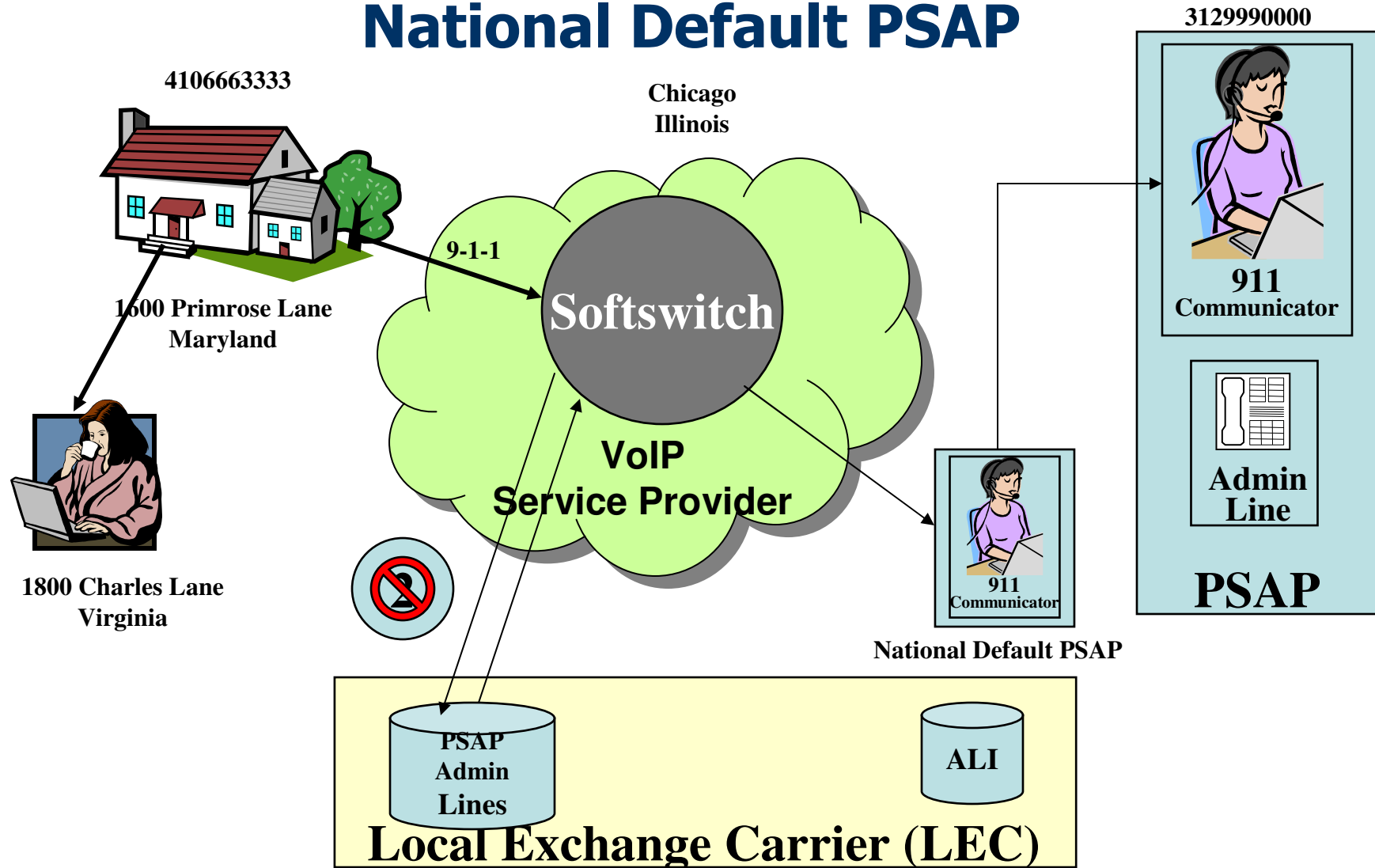
# Challenges with Default Routing

## "Long Distance" Switching



# Challenges with Default Routing

## National Default PSAP



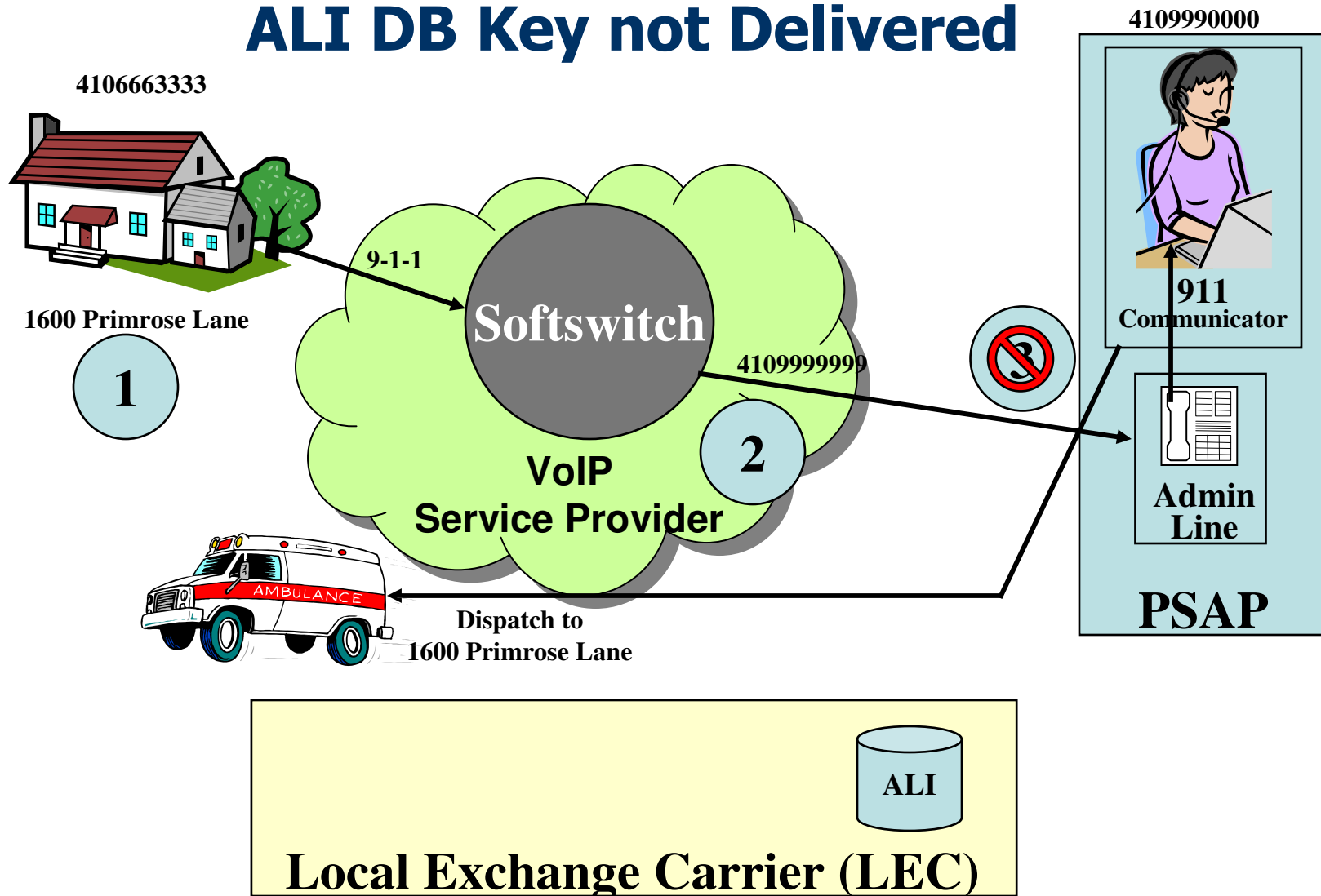
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# Location Info Not Automatically Delivered

## ALI DB Key not Delivered



# VoIP E9-1-1 Challenges: Business

- Business Issues
  - PSAP unwillingness to accept VoIP 9-1-1 call
    - PSAPs want to know the location of the caller at the time of call
      - Some providers are ignoring PSAPs and placing calls anyhow
  - VoIP providers financially supporting PSAPs
    - Wireline & wireless subscribers pay for PSAPs via user fees
    - VoIP providers are not required to pay fees to the state
  - No nationwide Municipal Street Address Guide (MSAG)
    - Older PSAP interfaces have dumb terminals and text limits
    - Abbreviations were devised to fit within text limits
    - MSAGs are defined at the local level
  - People beginning to not trust 9-1-1
    - Calling fire & police directly

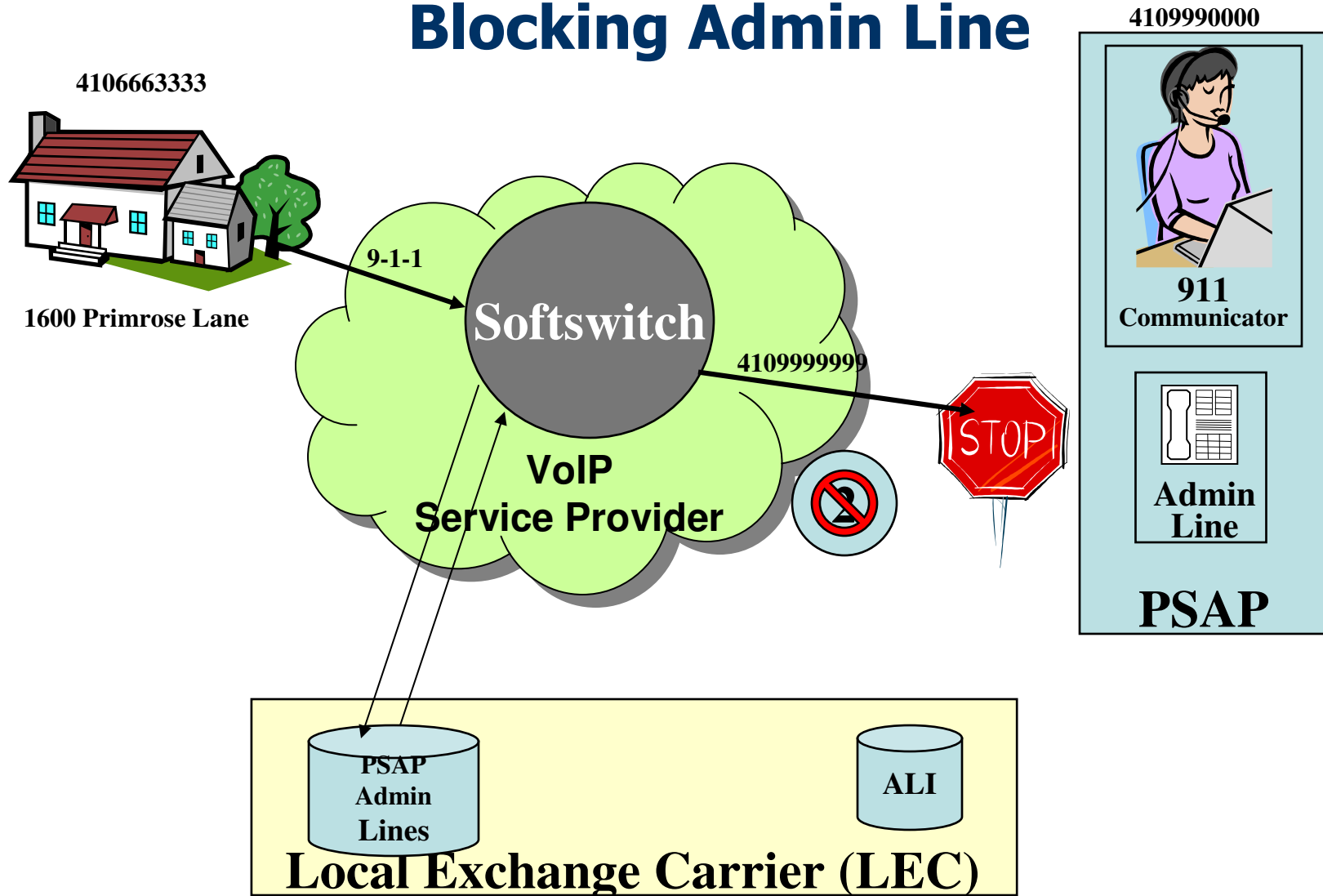


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# PSAPs Denying Calls to Admin Lines

## Blocking Admin Line

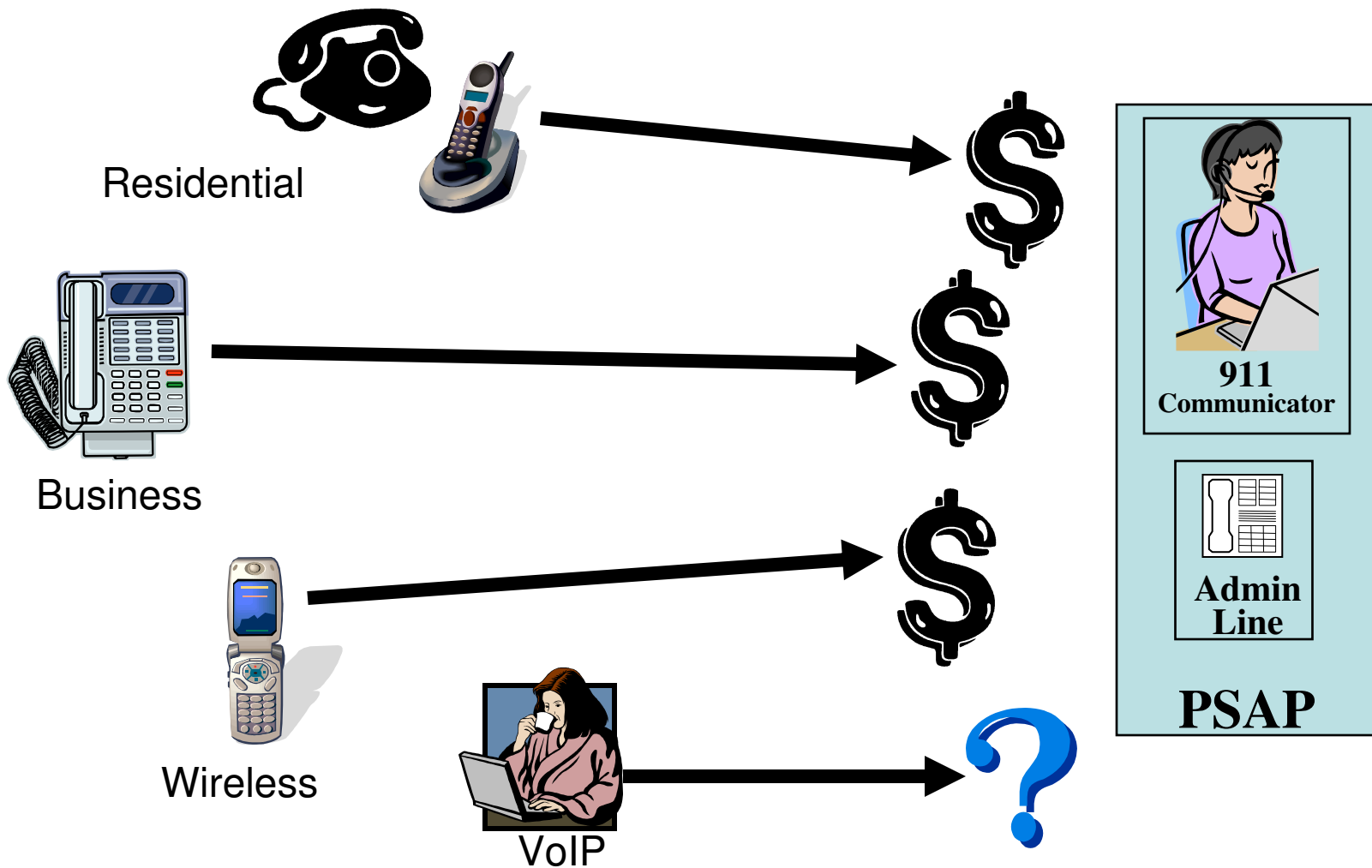


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# Funding the PSAPs

## Guidance Needed

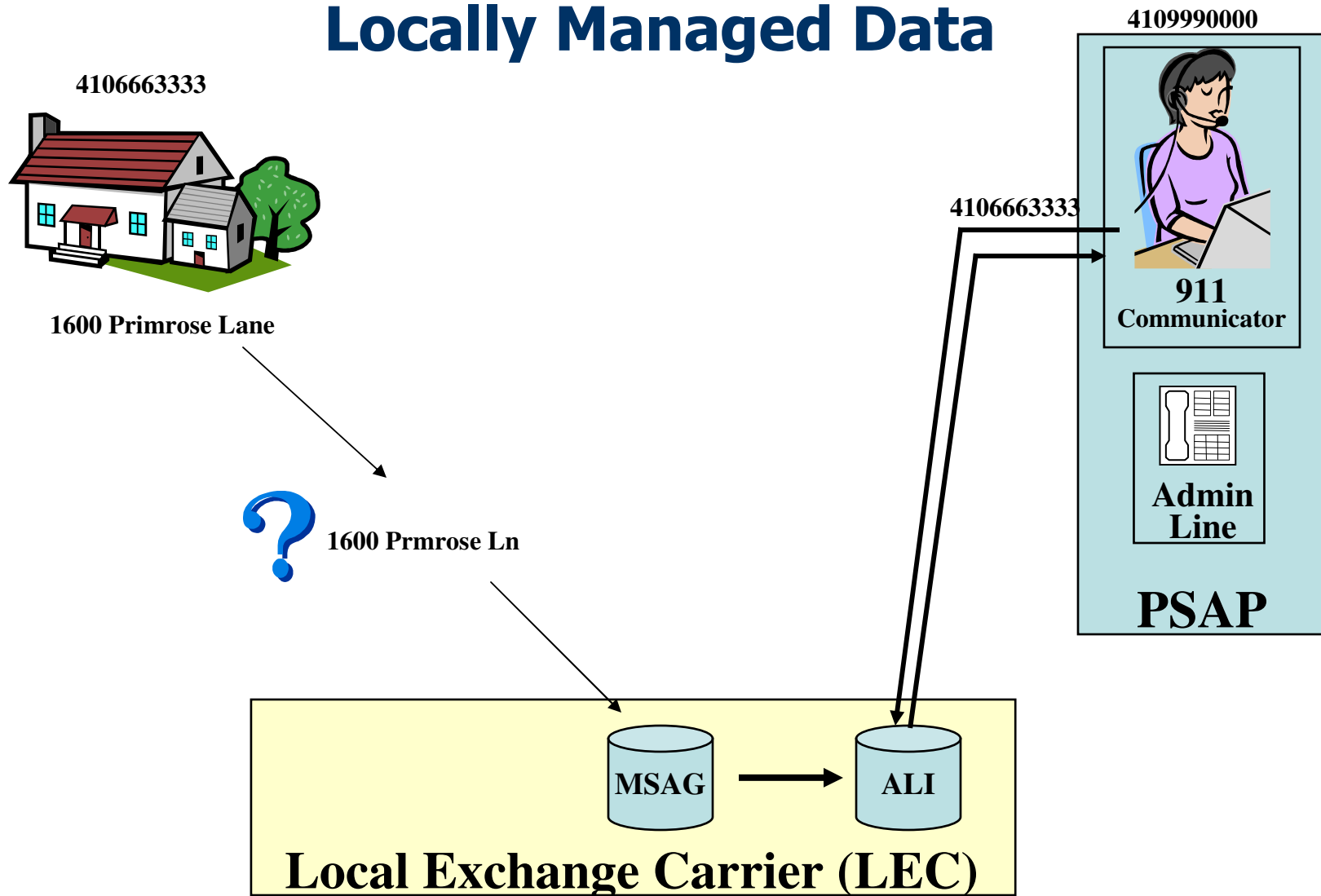


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# Lack of Nationwide MSAG

## Locally Managed Data

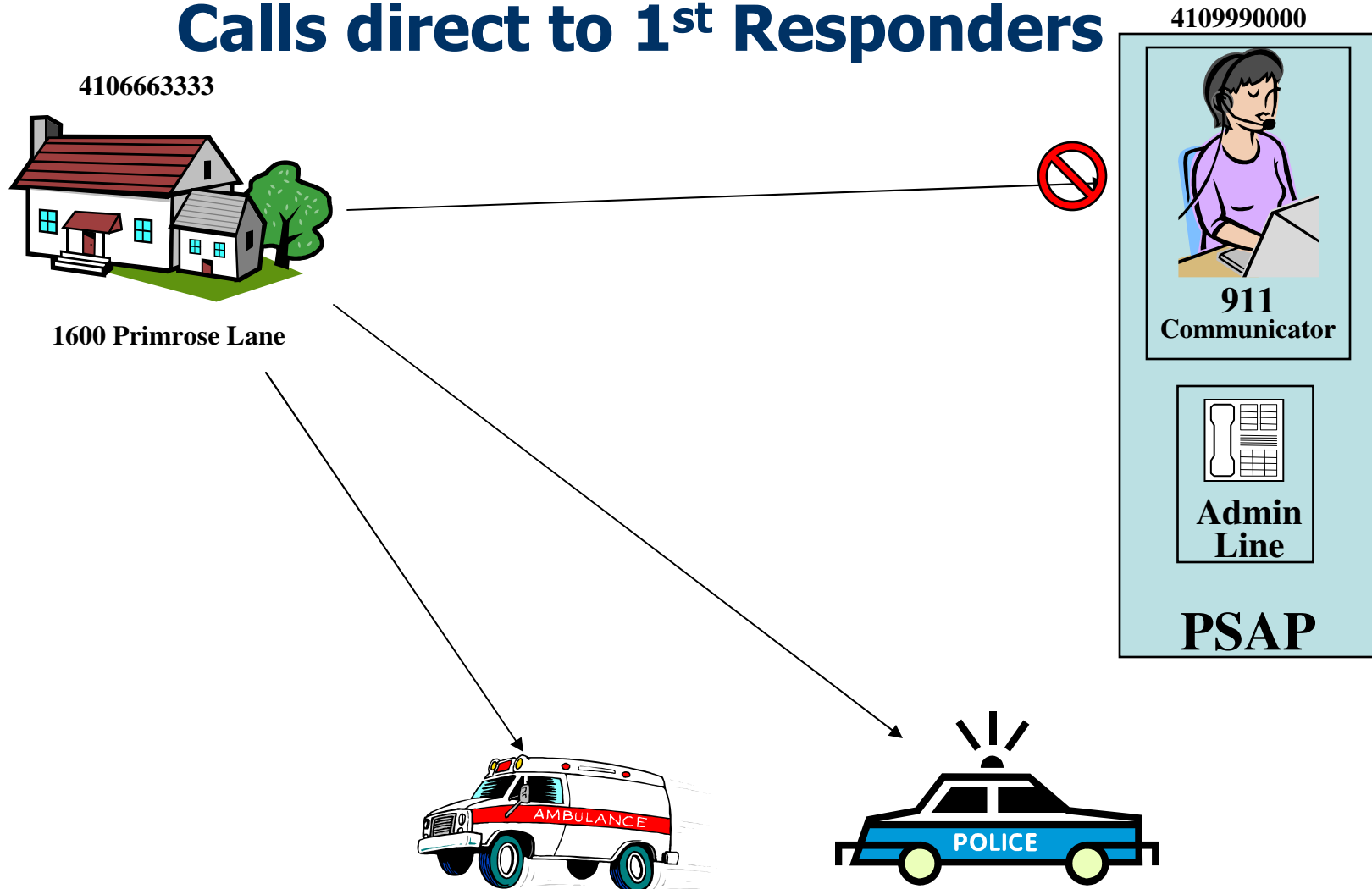


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# Public Confidence in 9-1-1 Is Eroding

## Calls direct to 1<sup>st</sup> Responders





# VoIP E9-1-1 Challenges: Regulatory

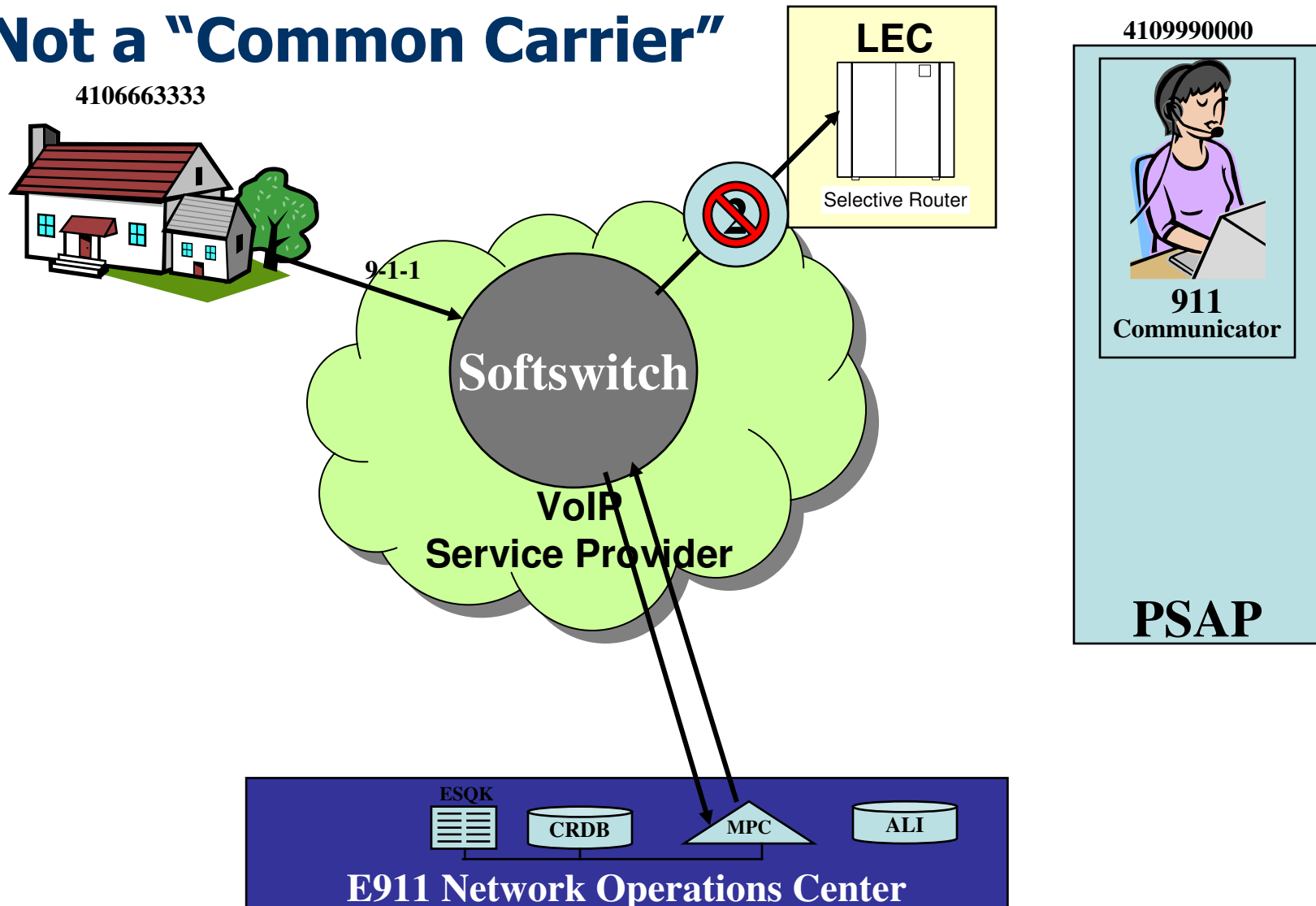
- Regulatory Issues
  - Access to selective routers
    - Only “Common carriers” can demand access to Selective Routers
    - Many VoIP Service Providers are NOT common carriers
    - Regulatory pressure is likely required to open up access
  - Debate over Federal vs. State jurisdiction
    - FCC has ruled that states have no jurisdiction over VoIP
    - Illinois might force VoIP Providers to provide same level of 911
      - Chicago Sun Times
    - Canada has already required this of fixed VoIP providers
  - Liability protection for E9-1-1
    - Wireless & wireline carriers protected unless gross negligence
    - VoIP Service Providers do not always fall under these protections

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# Denied Access to Selective Routers

## Not a "Common Carrier"



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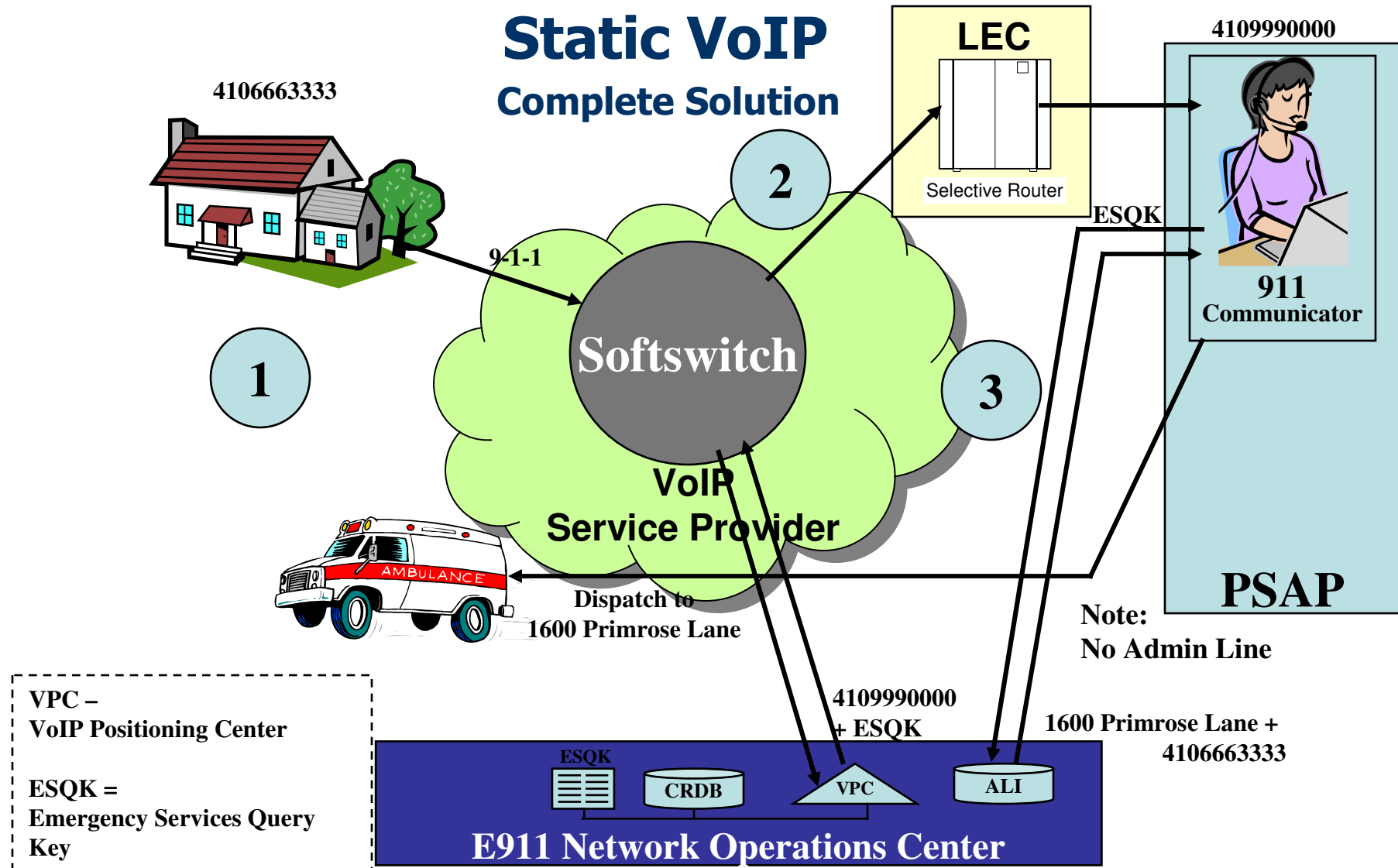
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# **Applying Lessons Learned from Wireless “The Network Approach”**

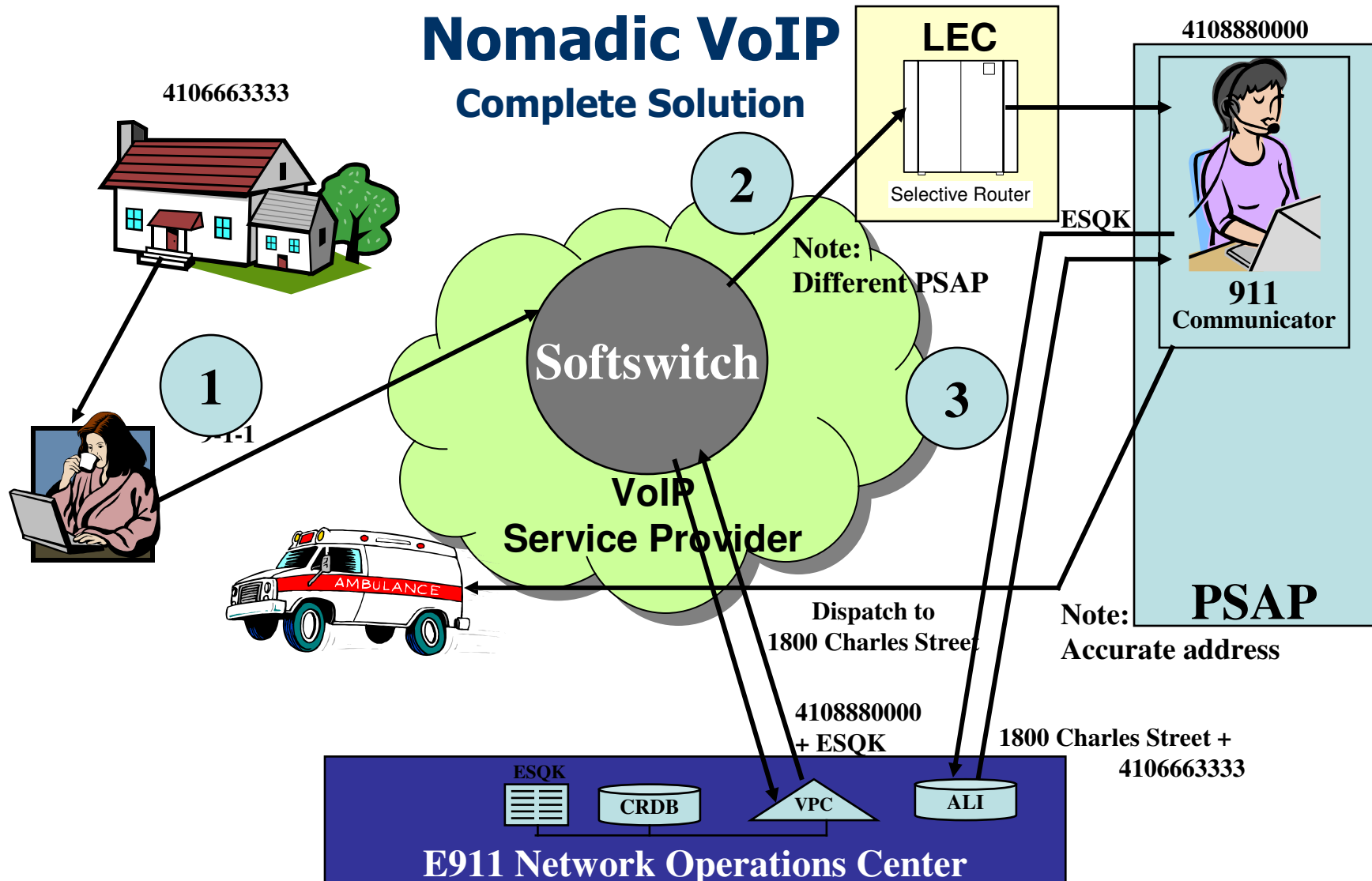
# Applying Wireless Lessons Learned

## Static VoIP Complete Solution



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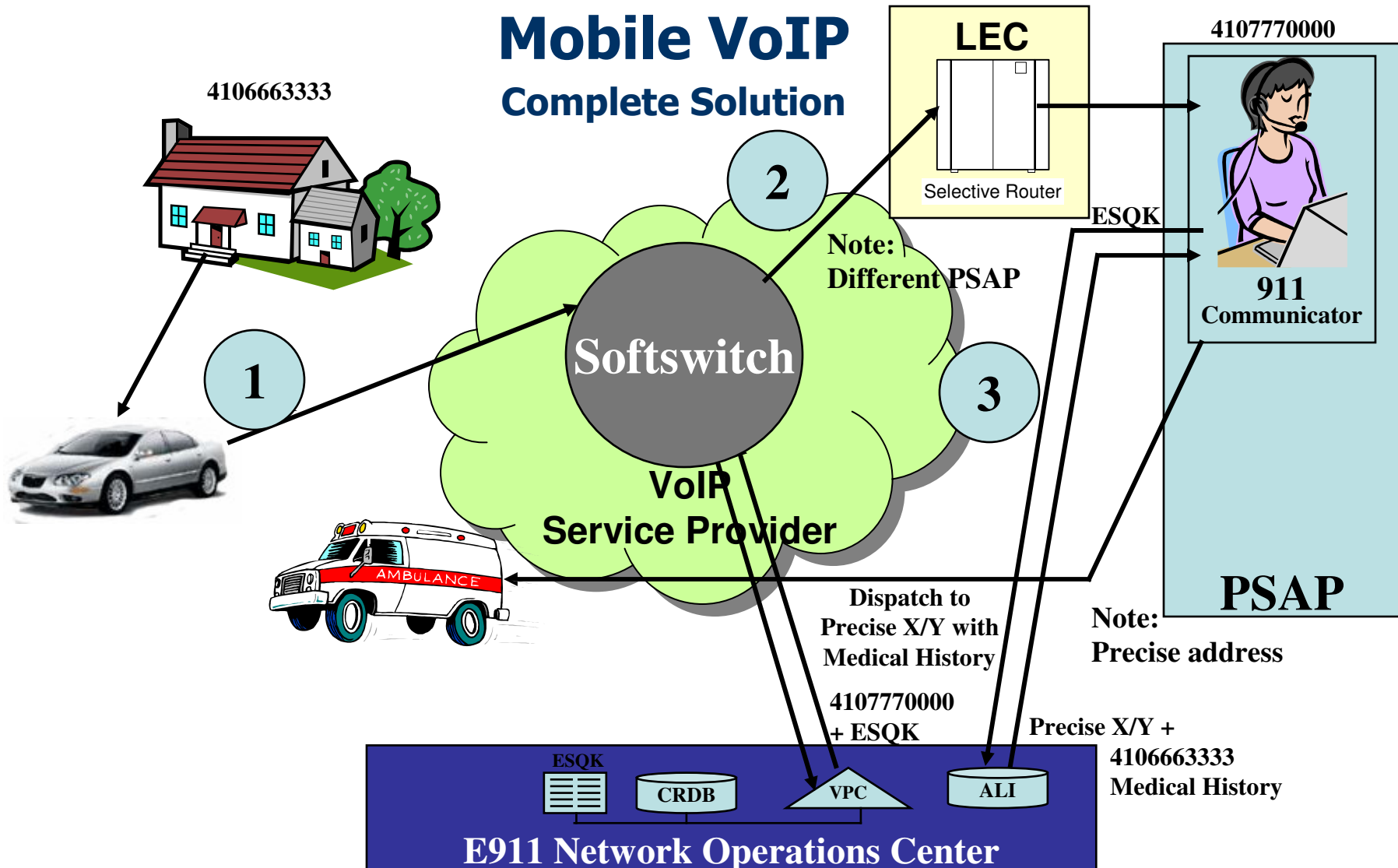
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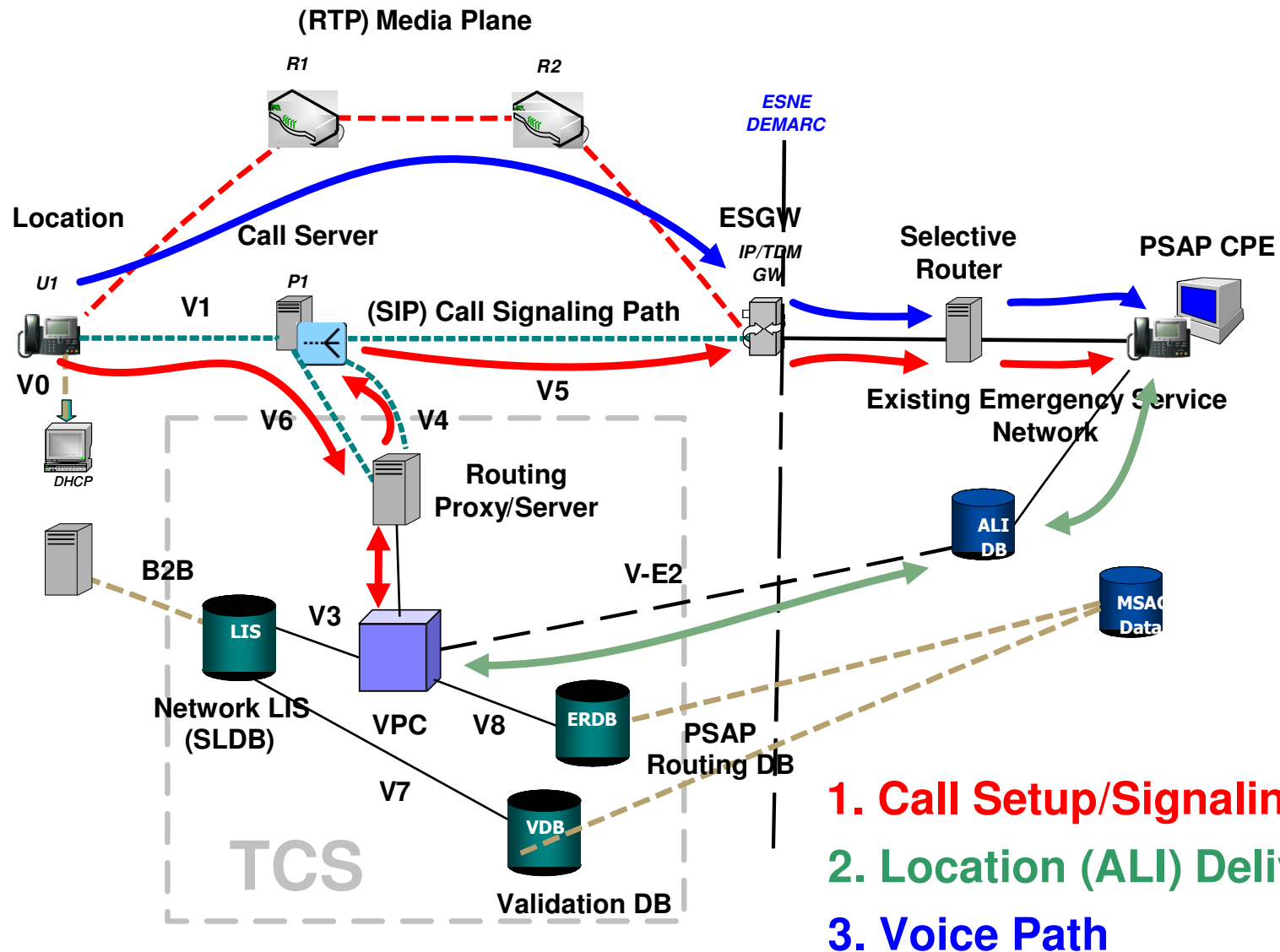


# Applying Wireless Lessons Learned

## Mobile VoIP Complete Solution



# Upcoming Trial of the I2 Call Model



# Applying Wireless Lessons: Technical

- Technical Issues

- Difficulty locating caller



- Location not automatically delivered to PSAP

- Challenges with “default” routing

- How do you route a call that does not have a location fix?



- Need for a nationwide admin line database



- Location information might not be up-to-date



- Location info population cannot work across jurisdictions

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# Applying Wireless Lessons: Business

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# Summary

- VoIP is a revolutionary technology
  - E9-1-1 needs to be solved
  - E9-1-1 solutions have multiple benefits:
    - Avoids Administrative Lines
    - Automatically delivers location
    - Provides ability to deliver additional information
  - VoIP Poses Challenges to E9-1-1
    - Technical
    - Business
    - Regulatory
- Many are solved with a network-based, wireless approach!**

**Restore caller confidence in 9-1-1!**



# Questions

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